

What is claimed is:

- AB1. A method of buffer segment management on a disc drive, comprising:
- wherein, for a read operation;
    - determining if one or more buffer segments comprise the data for a read command;
  - wherein, if the data is available then processing the data;
  - wherein, if the data is not available then:
    - determining if a current disc operation time is greater than or equal to one or more read time limits to transfer the data from a media to the one or more read buffer segments;
    - if the disc operation time is greater than the one or more read time limits then aborting the read command;
    - if the disc operation time is less than or equal to the one or more read time limits then reading the data;
  - wherein, for a write operation;
    - determining if the data storing size of one or more of the current write buffer segments is sufficient to store the data for a write command;
    - If the data storing size is sufficient to store the data then transferring the data;
    - If the data storing size is not sufficient to store the data then;
      - determining the data sizes of one or more write buffer segments minimizing the number of seek operations within one or more write time limits;
    - wherein, if transferring the data from the one or more write buffer segments is within the one or more write time limits then transferring the data; and
    - wherein, if transferring the data from the one or more write buffer segments is not within the one or more write time limits then aborting the write command.
2. The method of claim 1, wherein determining if the current disc operation time is greater than the one or more read time limits comprises determining the one or more read time limits.

3. The method of claim 2, wherein determining the one or more read time limits comprises determining the minimum number of seeks with respect to one or more data transfer rates.
4. The method of claim 1, wherein determining the data sizes of one or more write buffer segments minimizing the number of seek operations within one or more write time limits comprises determining the one or more write time limits.
5. The method of claim 4, wherein determining the one or more write time limits comprises determining the minimum number of seeks with respect to one or more data transfer rates and associated write buffer segments.
6. The method of claim 5, wherein determining the minimum number of seeks with respect to one or more data transfer rates and associated write buffer segments comprises adjusting the segment sizes with respect to the associated data rates wherein the summation of a plurality of ratios between the adjusted segment sizes and the respective data rates is indicative of a minimum number of seeks.
7. The method of claim 5, wherein for four or more data streams the number of seeks is within about 5 percent of the minimum number of seeks wherein the data stream rates are within about three orders of magnitude.
8. The method of claim 5, wherein for four or more data streams the number of seeks is within about 3 percent of the minimum number of seeks wherein the data stream rates are within about one order of magnitude.
9. A method of buffer segment management on a disc drive, comprising:  
wherein, for a read operation;  
establishing the command time limits for reading at least two data streams into a

read buffer segment;

determining the data rates for at least two read data streams to establish the time to read the data streams into the read buffer segment;

determining the read buffer segment size for each data stream with respect to each data stream data rate;

comparing the time required to read the at least two data streams into the read buffer segment with the time limits wherein if the time required to read the at least two data streams into the read buffer segment exceeds the command time limit then aborting the read; wherein if the time required to read the at least two data streams into the read buffer segment does not exceed the command time limit then reading the data; wherein for a write operation;

determining the data rates for at least two write data streams;

establishing the time limits for transferring data from the write buffer to a media;

wherein if the write buffer space is less than the write buffer size required then flushing at least one write buffer segment to provide more write buffer segment space; wherein if after flushing the write buffer segment the space is less than the size required then;

determining if the time limits will be exceeded; if the time limits will be exceeded then aborting the write operation; if the time limits will not be exceeded then transferring the data to the write buffer segments.

10. The method of claim 9, wherein determining the data rates for at least two write data streams comprises decoding the data streams.

11. The method of claim 9, wherein establishing the time limits for transferring data from the write buffer to a media comprises determining the command time limits.

12. The method of claim 9, wherein determining the read buffer segment size for each data stream with respect to each data stream data rate comprises determining the minimum number of seeks for each data stream.

13. The method of claim 9, wherein after the step of determining after flushing the write buffer segment the space is less than the size required then determining if the read buffer is available to store the write data; if the read buffer segment is available then transferring the write data to the read buffer segment, and if the read buffer segment is not available then aborting the write command.
14. A disc drive system comprising:  
a signal-bearing media means for storing data;  
a code memory means coupled to a read/write controller means for controlling the reading and writing of data to the signal-bearing media,  
means for reading and writing the data to the signal-bearing media;  
a processor means coupled to the code memory and the read/write controller comprising a program for managing memory segments wherein the memory segments are sized based on data rate parameters.
15. The system of claim 14, wherein the program when executed by the processor means performs the steps of:  
determining if one or more buffer segments comprise the data for a read command;  
wherein, if the data is available then processing the data;  
wherein, if the data is not available then:  
determining if a current disc operation time is greater than or about equal to one or more read time limits to transfer the data from a media to the one or more read buffer segments;  
if the disc operation time is greater than the one or more read time limits then aborting the read command;  
if the disc operation time is less than or about equal to the one or more read time limits then reading the data;  
wherein, for a write operation;

determining if the data storing size of one or more of the current write buffer segments is sufficient to store the data for a write command;

If the data storing size is sufficient to store the data then transferring the data;

If the data storing size is not sufficient to store the data then;

determining the data sizes of one or more write buffer segments minimizing the number of seek operations within one or more write time limits;

wherein, if transferring the data from the one or more write buffer segments is within the one or more write time limits then transferring the data; and

wherein, if transferring the data from the one or more write buffer segments is not within the one or more write time limits then aborting the write command.

16. The method of claim 15, wherein determining if the current disc operation time is greater than the one or more read time limits comprises determining the one or more read time limits.

17. The method of claim 16, wherein determining the one or more read time limits comprises determining the minimum number of seeks with respect to one or more data transfer rates.

18. The method of claim 15, wherein determining the data sizes of one or more write buffer segments minimizing the number of seek operations within one or more write time limits comprises determining the one or more write time limits.

19. The method of claim 18, wherein determining the one or more write time limits comprises determining the minimum number of seeks with respect to one or more data transfer rates and associated write buffer segments.

20. The method of claim 19, wherein determining the minimum number of seeks with respect to one or more data transfer rates and associated write buffer segments comprises adjusting the segment size with respect to the associated data rates wherein

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Atty. Dkt. 8045145/ SEA5145.01

the summation of a plurality of ratios between the adjusted segment sizes and the respective data rates is indicative of the minimum number of seeks.

